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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Integrated statistical modelling of spatial landslide probability" *by* M. Mergili and H.-J. Chu

Anonymous Referee #1

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The article presents a new approach in order to assess spatial landslide probability at a regional scale. The procedure allows for release areas assessment and estimation of the impact probability in the propagation zone, by deriving statistics from an inventory of events. The approach is statistical by nature and thus allows for a good characterization of both the release and the impact probabilities, in a rigorous way. The approach and the discussion on the issue of zonal probability are worth publishing. I have however some concerns about the release area assessment. The paper is well written and the figures are of good quality.

General comments:

- The paper is well written and of high quality. The structure is fine.

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- The figures are of very good quality and help understanding the text.
- There are plenty of abbreviations or acronyms, and truth is, it pretty hard to keep them all in mind. Table 1 with the various probabilities definitions is fine, but would it be a possibility to list them all somewhere? Or should you reduce the number?
- The approach is interesting, seems fairly robust, and is worth publishing.
- However, I have 2 concerns. The first one is the fact that you try to encompass all types of gravitational mass movements, as you say by the end of the Introduction. It is known that the triggering factors and the propagation behavior differ considerably from a phenomenon to another. I would agree to your approach when you consider them separately, both for the release and the impact probabilities. In your case study however, you seem to focus on shallow landslides or debris flow, which is not so clear. You may be more specific on what contains your inventory map.
- My second concern is about the predictors used for the assessment of the release areas. Using only local slope and aspect as predictors for shallow landslides and debris flows is rather poor. This results in a not so relevant map of Pr. The use of geological maps and landuse information, may they exist, should be considered or at least discussed, as well as stability indexes or flow accumulation data, which can be processed on the DEM. This part is regrettable as it also impacts the other results. Moreover, you argue in favor of specific meteorological conditions related to a single event, which is not wrong, but you don't question your selection of predictors.

Specific comments:

- P.5683 l.9: you may provide some examples of predictors to help the reader understand.

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- P.5685 l.3-5: you may specify which routing you consider here: a single flow algorithm (D8) or your random walks?
- P.5688 l.15: it would be appreciable to have 1-2 sentences to describe the properties / behavior of your random walks.
- P.5689 l.20: it should be Fig. 7d and not 7c.
- P.5690 & Fig. 7e: I don't really get what represents Figure 7e. Is it here the upslope contributing area or an aggregate of zone with random sizes as defined at p.5684?
- P.5690 l.18-19: Is it P_{RZ} and σ_{PRZ} or P_L σ_{PL} ??
- P.5691 l.7: is it P_I or P_I^* ?
- Table 1: is Pi the probability starting from all pixels, even with a release probability of zero ?
- Table 2: the arrangement is a bit confusing. First, the elements in the MEA column should be spread in the rows, right? Then, can you put the content of the Description and Components columns vertically aligned is the middle? That would be easier to understand they are not related to a specific row, but to the whole section (eg. 1A-D).
- Figure 1: A part of the line is missing after "Landslide inventory".
- Figure 9: the choice of the colors is not optimal here. We don't see the red on red and the yellow on blue and green.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 5677, 2015.